DirectOut TECHNOLOGIES

MA2CHBOX.XL

User's Manual

Version 1.2

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About This Manual

How to Use This Manual

This manual guides you through the installation and operation of the device.
Use the Table of Contents at the beginning of the manual or Index Directory at the end of the document to locate help on a particular topic. You can access more information and latest news by visiting on the DirectOut website at www.directout.eu.

Conventions

The following symbols are used to draw your attention to:

TIPS!

indicate useful tips and shortcuts.

NOTES!

are used for important points of clarification or cross references.

WARNINGS!

alert you when an action should always be observed.

Chapter 1: Overview

Introduction

Welcome to the MA2CHBOX.XL, DirectOuts two channel monitor for MADI and AES signals.

The MA2CHBOX.XL can monitor any mono channel or any stereo pair of 64 audio channels from a MADI stream or the incoming AES signal.
An internal routing matrix provides signal routing between all I/Os.

Interfaces:

- MADI I/O (SC optical, BNC coaxial, SFP cage)
- AES3 I/O
- Line Out (stereo)
- Headphone output (stereo)
- USB Port for transmission of serial data ('Serial over MADI'), remote control and firmware updates.

Feature Summary

MADI Ports	1 x SC multi-mode connectors 1 x SFP (empty cage without module) 1 x coaxial BNC connectors
AES Port	1 x AES3 I/O (adaptor DSUB-9 to XLR male/female)
Line Output	1 x stereo, balanced, + 24 dBu (adaptor DSUB-9 to XLR male/female)
Headphone Output	6.3 mm TRS jack, stereo, + 18 dBu
USB Port	USB 2.0 port for remote control, (de-) embedding serial data and firmware updates supported OS: Windows XP, Vista, 7, 8
MADI Formats	56/64 channel, 48k/96k Frame, S/MUX 2/4
Sample Rates	44.1, 48, 88.2, 96, 176.4, 192 kHz +/- 12.5%
Audio Routing Matrix	Audio signal routing on a per channel basis.
Serial Embedder Routing	Matrix to (de-)embed and route RS-232 data.
MIDI over MADI Routing	Matrix to route embedded MIDI data
Power Supply	This device is equipped with one wide range power supply (84 V to 264 V AC / 47 Hz to 63 Hz / safety class 1).

Applications

Providing 194 input channels and 198 output channels the MA2CHBOX.XL can be used for monitoring and signal distribution. Further it can act as (de-)embedder of serial data.

Typical applications include:

- signal control of MADI signals within a signal chain; e.g. on stage for line check.
- external monitors- the selected channel pair for monitoring is copied to the Line out and/or AES output feeding e.g. external monitors.
- recording with redundant systems- the incoming MADI signal is mirrored to the other MADI outputs feeding secondary recording systems.
- signal distribution- all I/Os are accessed via routing matrix which is controlled by a software remote.

How it works

The input is selected for each output individually in the menu. By turning the encoder knob, the desired channel pair is accessed or the volume adjustment is done.
The internal routing matrix is configured by a software remote and stored in the device.

CHAPTER 2: Legal issues & facts

Before Installing This Device

WARNING!

Please read and observe all of the following notes before installing this product:

- Check the hardware device for transport damage.
- Any devices showing signs of mechanical damage or damage from the spillage of liquids must not be connected to the mains supply, or disconnected from the mains immediately by pulling out the power lead.
- All devices must be grounded. The device is grounded through its IEC power connections.
- All devices must be connected to the mains using the three-cord power leads supplied with the system. Only supply electrical interfaces with the voltages and signals described in these instructions.
- Do not use the device at extreme temperatures. Proper operation can only be guaranteed between temperatures of 5° C and 45° C and a maximum relative humidity of 80 %, non-condensing.
- The cabinet of the device will heat up. Do not place the device close to heating sources (e.g. heaters). Observe the environmental conditions.

First Aid (in case of electric shock)

WARNING!

- Do not touch the person or his/her clothing before power is turned off, otherwise you risk sustaining an electric shock yourself.
- Separate the person as quickly as possible from the electric power source as follows:
  - Switch off the equipment.
  - Unplug or disconnect the mains cable.
- Move the person away from the power source by using dry insulating material (such as wood or plastic).
- If the person is unconscious:
  - Check their pulse and reanimate if their respiration is poor.
  - Lay the body down and turn it to one side. Call for a doctor immediately.
- Having sustained an electric shock, Always consult a doctor.

Defective Parts/Modules

WARNING!

This device contains no user-serviceable parts.
Therefore do not open the device.
In the event of a hardware defect, please send the device to your DirectOut representative together with a detailed description of the fault.
We would like to remind you to please check carefully whether the failure is caused by erroneous configuration, operation or connection before sending parts for repair.

Updates

DirectOut products are continually in development, and therefore the information in this manual may be superseded by new releases. To access the latest documentation, please visit the DirectOut website: www.directout.eu.

This guide refers to firmware version 1.5.

Intended Operation

The MA2CHBOX.XL is designed for monitoring MADI signals (AES10) or AES signals (AES3) via headphones or line output or AES.

WARNING!

No compensation can be claimed for damages caused by operation of this unit other than for the intended use described above. Consecutive damages are also excluded explicitly. The general terms and conditions of business of DirectOut GmbH are applied.

Conditions of Warranty

This unit has been designed and examined carefully by the manufacturer and complies with actual norms and directives.
Warranty is granted by DirectOut GmbH over the period of two years for all components that are essential for proper and intended operation of the device. The date of purchase is applied for this period. Consumable parts (e.g. battery) are excluded from warranty claims.

WARNING!

All claims of warranty will expire once the device has been opened or modified, or if instructions and warnings were ignored.
For warranty claims please contact the dealer where your device was acquired.

Conformity & Certificates

CE

This device complies with the basic requests of applicable EU guidelines. The appropriate procedure for approval has been carried out.

RoHS

(Restriction of the use of certain Hazardous Substances)
This device was constructed fulfilling the directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC.

WEEE

(Directive on Waste Electrical and Electronic Equipment)
Due to the directive 2002/96/EC for waste disposal this device must be recycled.
For correct recycling please dispatch the device to:
IMM Elektronik GmbH,
Leipziger Str. 32
09648 Mittweida
Germany
Only stamped parcels will be accepted!
WEEE-Reg.-No. DE 93924963

Contact

Sales:
DirectOut GmbH, Leipziger Str. 32, 09648 Mittweida, Germany
Phone: +49 (0)3727 99697-50 // Fax: +49 (0)3727 99697-52
www.directout.eu

Manufacturer:
IMM Elektronik GmbH, Leipziger Str. 32, 09648 Mittweida, Germany
Phone: +49 (0)3727 6205-0 // Fax: +49 (0)3727 6205-56
www.imm-gruppe.de

Contents

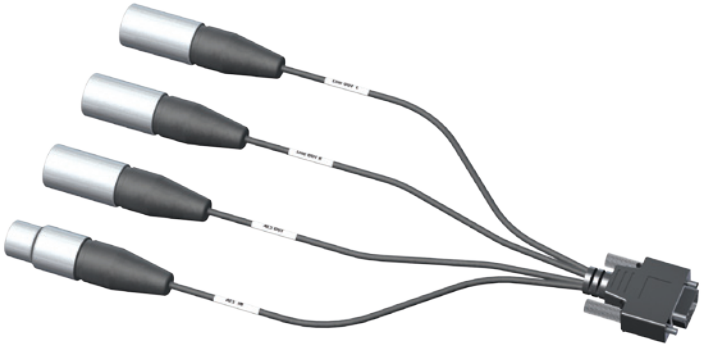
The contents of your MA2CHBOX.XL package include:

- 1 x MA2CHBOX.XL
- 1 x DSUB-9 to XLR adaptor
- 1 x power chord
- 1 x Manual

To complete the delivery, download the USB serial driver and software remote application from the website.
Link: http://www.directout.eu

Accessory

The Line Out and AES3 I/O are available as a DSUB-9 socket.
For adaption between DSUB-9 and XLR plugs an adaptor is offered.



DSUB-9 to XLR adaptor

Signal	XLR
Line Out L	male
Line Out R	male
AES3 input	female
AES3 output	male

Pinout DSUB-9: See „Appendix A: Wiring AES I/O, Line Out“ on page 73.

Two different optical SFP modules are available from DirectOut GmbH:

- Multimode SFP transceiver with LC connectors (No: 11900-129)
- Singlemode SFP transceiver with LC connectors (No: 11900-130)

Specification of the optical SFP modules:

SFP	Multimode	Singlemode
Wavelength TX	1310 nm	1310 nm
Wavelenght RX	1310 nm	1310 nm
Distance	2 km	10 km
Powerbudget (dB)	11 dB	12 dB
Protocols	Fast Ethernet OC3/ STM1	Gigabit Ethernet, Gigabit Fibre Channel
Bandwidth from	100 Mbit/s	1.050 Gbit/s
Bandwidth	155 Mbit/s	1.250 Gbit/s
Laser	FP	FP
Receiver Type	PIN	PIN
Connector	LC	LC
Wavelength TX min	1260 nm	1260 nm
Wavelength TX max	1360 nm	1360 nm

SFP	Multimode	Singlemode
Wavelength RX min	1260 nm	1260 nm
Wavelength RX max	1620 nm	1600 nm
Transmit min	- 19.00 dBm	- 9.00 dBm
Transmit max	- 14.00 dBm	- 3.00 dBm
Receive min	- 30 dBm	- 21.00 dBm
Receive max (Receiver overload)	- 5.00 dBm	- 3.00 dBm
Temperature (min)	0° Celsius	0° Celsius
Temperature (max)	70° Celsius	70° Celsius
Type of DDM/DOM	internal	internal
Extinction Ratio	8.20 dB	9 dB

Chapter 3: Installation

Installing the Device

1. Open the packaging and check that the contents have been delivered complete and undamaged.
2. Place the device on a non-slip horizontal surface. The delivered pads may be affixed to the bottom of the cabinet. Ensure a clean and dry surface before affixing the pads.

WARNING

The synthetics of the delivered pads might cause stains on damageable surfaces. To avoid staining of furniture surfaces it is recommended to place a protective plate under the device.

WARNING

Avoid damage from condensation by waiting for the device to adapt to the environmental temperature. Proper operation can only be guaranteed between temperatures of 5° C and 45° C and a maximum relative humidity of 80%, non-condensing.
Ensure that the unit has sufficient air circulation for cooling.

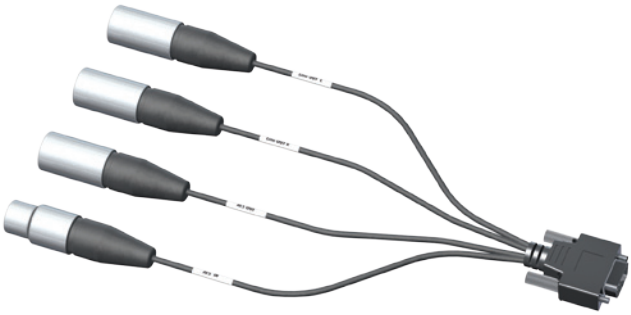
3. Remove the protective cap from the optical MADI port(s) before use.

NOTE!

Retain the protective cap if the optical port is unused. This will protect against soiling which can lead to malfunction.

4. Connect signal cable(s) for the MADI signals.

5. Connect the signal cables for the analog and AES3 audio signals to the DSUB-9 adaptor. Connect the adaptor to the DSUB-9 plug at the rear panel.



The adaptor converts from DSUB-9 (male) to:

- 2 x XLR male (Line Out L/R)
- 1 x XLR male (AES3 output)
- 1 x XLR female (AES3 input).

WARNING!

Do not connect voltage sources to the analog outputs. This may cause damage at the output stages. Observe the technical specifications listed in this document.

WARNING

The line output is not servo balanced. Do not connect the negative lead to ground. This may cause damage at the output stage. Observe the technical specifications listed in this document.

6. Optional: Connect an USB cable to the USB port for remote control or firmware updates. This requires the USB Serial driver (Windows) being installed first. The driver and the installation instructions are available at www.directout.eu.

7. Using the power cord provided connect the PSU to a matching power supply:

WARNING

This device must be connected to the mains using the three-cord power leads supplied with the system. Only supply the voltages and signals indicated (84 V – 264 V).

8. Turn on the power switch:

While the device is booting the currently installed firmware is indicated in the display- e.g. firmware version 1.5.

TIP

Use the DirectOut Release Map to match your DirectOut device with the latest firmware or software release.
Link: http://www.directout.eu/upload/dokumente/dotec_release_map.pdf

NOTE

To update the firmware an installed USB serial driver (Windows) and the Update Tool are necessary. The software and the installation instructions are available at www.directout.eu.

9. Installation of USB Serial driver

- download the USB Serial driver
- download the 'Installation Guide for USB Control
- follow the installation instructions in the 'Installation Guide for USB Control'

TIP

Keep any packaging in order to protect the device should it need to be dispatched for service.

CHAPTER 4: Operation

Introduction

This chapter describes the basic operation of the device.

Note that throughout this manual, the abbreviation FS refers to sample rate or sample frequency. So, when dealing with scaling factors, the following sample rates can be written as:

- 44.1 kHz or 48 kHz = 1 FS
- 88.2 kHz or 96 kHz = 2 FS
- 176.4 kHz or 192 kHz = 4 FS

Global Control

Power	**C13 socket** Connect the power supply here (84- 264 V AC).

NOTE

The display indicates that a working power supply is connected to the power supply unit. Note that an unlit display does not guarantee that the device is free of voltage. To ensure that the device is completely disconnected from mains voltage, the power chord(s) must be disconnected.

Power	**1 Switch** Enable / disable power supply.
Volume*	**1 Encoder** Press and turn for all operations (channel selection, volume, menu settings). Press short to toggle between volume and channel selection (Vol/Ch) or to navigate through the menu. Press for more than 2 seconds to toggle between Vol/Ch and the menu. Press twice ("double click") to mute / unmute the output. Turning the encoder knob at volume selection will also unmute the output

* Mute is available for the outputs Headphones, Line Out and AES. It is applied only to outputs that are set to 'Encoder' ('E') in the menu- see section 'Level Settings' on page 40.

Input / Sync

Input

Four inputs are available:

- MADI- SC optical
- MADI- BNC coaxial
- MADI- SFP cage
- AES- DSUB-9 adaptor

Sync

The device is clocked according the setting specified in the menu.

See S <x> (MENU) on page 38.

NOTE

Auto Sync- if only **one** signal is connected, it will be used as clock source ignoring the sync setting.

SYNC SC BNC SFP AES	**LED (green) - indicates sync status of the <SC> / <BNC> / <SFP> / <AES> input.** LED OFF = no signal LED flashing = signal present, asynchronous (LOCK) LED ON = signal present, synchronous (SYNC)

If no input detects a valid signal, all four LEDs will pulse.

Display / Menu

The 7 segment display indicates the selected channel pair, adjusted volume, level, menu settings.

The display is used in two modes:

- idle mode- volume (or channel) selection or level metering
- menu mode- menu settings

After a short period of time without using the encoder knob the **idle mode** becomes active; i.e. the menu is left automatically and the display switches back to
level metering or **vol (or channel)** selection.

NOTE

Firmware 1.3 (Q4/2014) introduces a default setting for either channel or volume selection in idle mode- see „Idle Mode“ on page 34.

 Number & Decimal Point(s)	**The selected channel (pair) is indicated.** In stereo mode odd numbers are indicated only; e.g. <05.> is selected = monitoring of MADI channels 05 (left) and 06 (right) In mono mode all channels are indicated. Blinking of left decimal point indicates: Mute active. Blinking numbers indicate: channel not available (at scaling factor 2 FS or 4 FS or in 56ch mode)
 Number	**The adjusted volume level is indicated.** The signal can be varied within a range of-96 dBFS to 0 dBFS in steps of 1 dB. An additional boost up to 9 dB can be applied. Blinking numbers indicate: Mute active.

Idle Mode

To change default encoder selection in idle mode:

- switch off / on device
- push encoder knob during firmware display
- the selection is indicated by the right decimal point

	idle channel
	idle volume

This setting is also available in the software remote.

Push the encoder knob for more than 2 seconds to enter the menu.

Display		*Meaning*
Signal Routing	**h <x>**	**Selected audio input for headphones out.** Values: o = SC input / b = BNC input / c = SFP input / A = AES input / M = matrix
	L <x>	**Selected audio input for line out** Values: o = SC input / b = BNC input / c = SFP input / A = AES input / M = matrix
	A <x>	**Selected audio input for AES out.** Values: o = SC input / b = BNC input / c = SFP input / A = AES input / M = matrix
	o <x>	**Selected audio input for SC optical out.** Values: o = SC input / b = BNC input / c = SFP input / A = AES input* / M = matrix
	b <x>	**Selected audio input for BNC coaxial out.** Values: o = SC input / b = BNC input / c = SFP input / A = AES input* / M = matrix
	c <x>	**Selected audio input for SFP output.** Values: o = SC input / b = BNC input / c = SFP input / A = AES input* / M = matrix

* Firmware 1.3 introduces AES input as source for the MADI outputs.
Selecting <A> for the MADI outputs (parameter <o>, <b>, <c>) will feed the two AES input channels alternately to all MADI output channels.

NOTE

The software remote offers access to more settings:

- matrix channel based signal routing (M)
- channel mode for the output signal
- frame format for the output signal @ 2 FS
- bit-transparent processing of AES input signal
- configuration of serial embedder routing
- routing of MIDI over MADI data

Display		*Meaning*
System Settings	**F <x>**	**Selected input scaling factor.*** Values: 1 = 1 FS / 2 = 2 FS / 4 = 4 FS
	S <x>	**Sync Source**** Values: o = SC input / b = BNC input / c = SFP input / A = AES input
	C <x>	**Monitor mode is indicated.***** Values: 1 = mono / 2 = stereo
	d <x>	**Level metering (display) during idle mode.******** Values: 0 = off / 1 = on

* A 96k Frame signal at the input that is defined as clock source will override the setting and force the scaling factor to 2 FS temporarily. The set value is restored once a 48k Frame signal is detected. Override is indicated by blinking display of 1 FS or 4 FS.

** If only one input is locked the setting is ignored and this input is used as clock source.

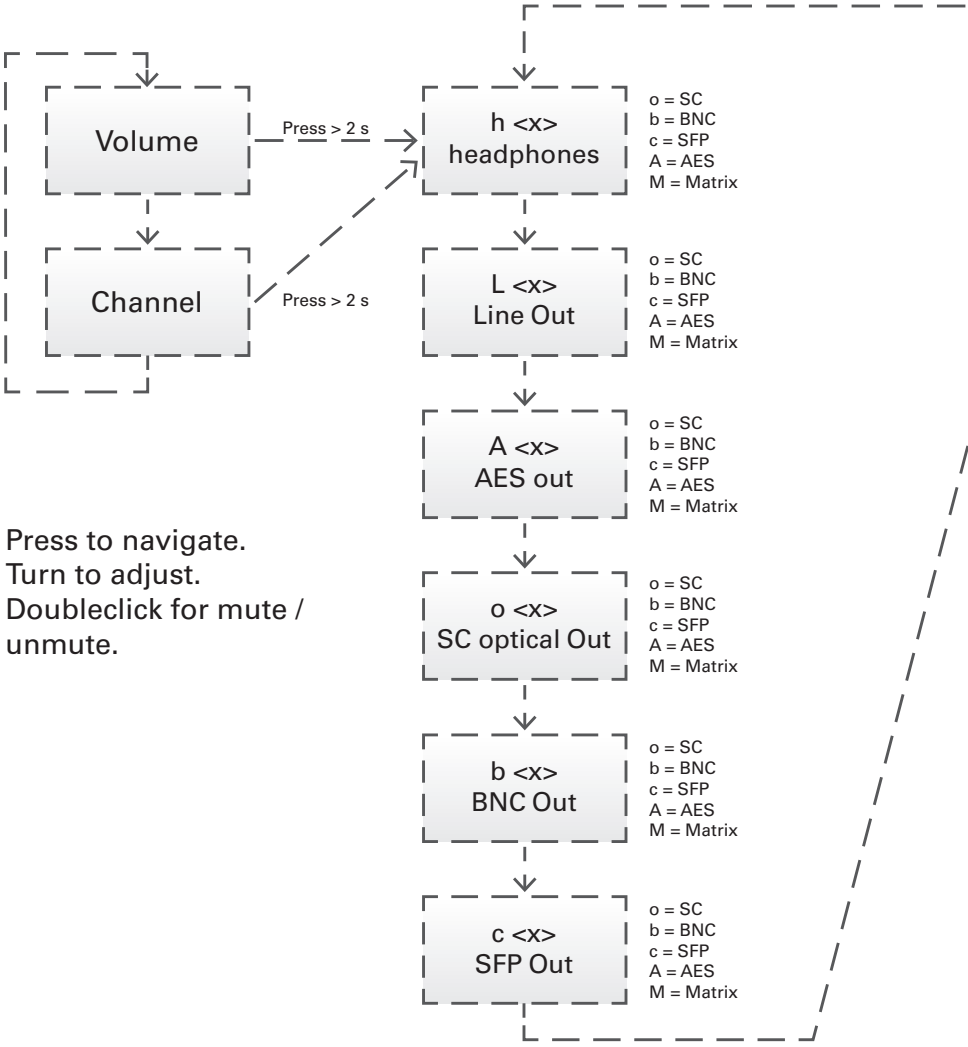
*** Monitoring of either a stereo pair or a single mono channel.
Stereo => odd channels to left and even channels to right.
Mono => left and right are identical.
This setting affects the indication of channels too (see <Numbers> + Decimal points).
Using AES as input source (<AA>) will override the setting and force to stereo temporarily.

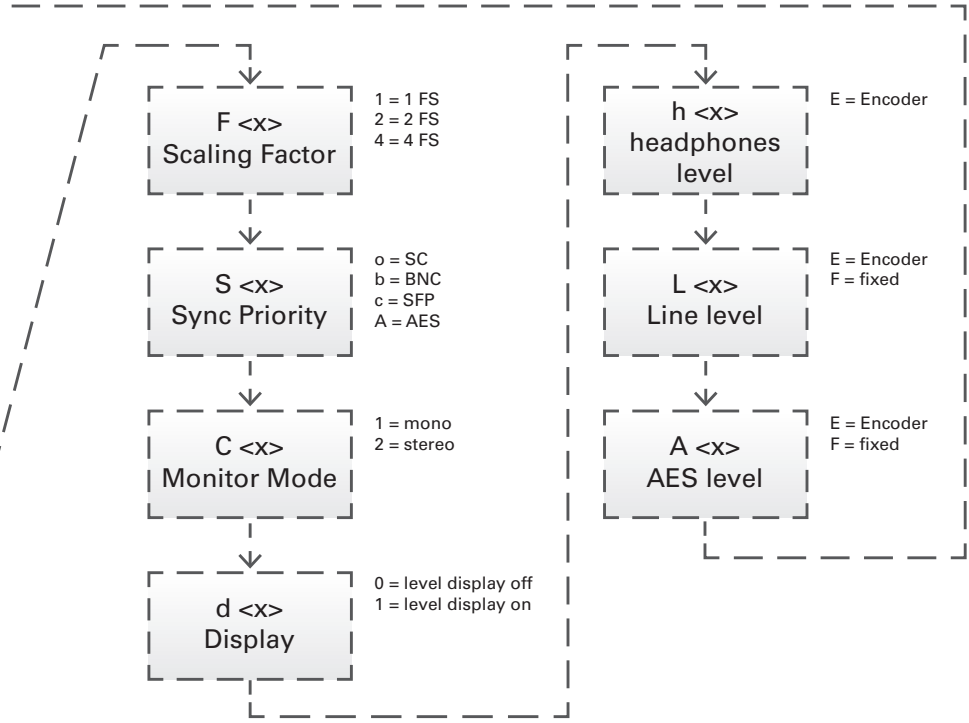
**** After a short period of time without using the encoder knob the idle mode is activated.
The display then indicates the input level for the left and right channel individually. The three horizontal bars of the segment display mark the values -30 dBFS, -18 dBFS and -6 dBFS.
The decimal point indicates a signal different from digital zero.

Display		*Meaning*
*Level Settings**	**h <x>**	**Level of headphones out** Values: E = encoder, output level variable (follows the volume setting)
	L <x>	**Level of Line out** Values: F = fixed, output level fixed E = encoder, output level variable (follows the volume setting)
	A <x>	**Level of AES out** Values: F = fixed, output level fixed E = encoder, output level variable (follows the volume setting)

* If the value is set to 'E' (= Encoder) the output will mute if the encoder is pressed twice.

Menu Map

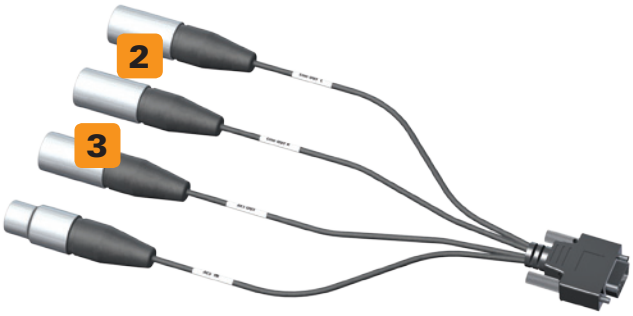

Volume
Press > 2 s
Channel
Press > 2 s
h <x>
headphones
L <x>
Line Out
A <x>
AES out
o <x>
SC optical Out
b <x>
BNC Out
c <x>
SFP Out
o = SC
b = BNC
c = SFP
A = AES
M = Matrix
Press to navigate.
Turn to adjust.
Doubleclick for mute / unmute.


F <x>
Scaling Factor
1 = 1 FS
2 = 2 FS
4 = 4 FS
S <x>
Sync Priority
o = SC
b = BNC
c = SFP
A = AES
C <x>
Monitor Mode
1 = mono
2 = stereo
d <x>
Display
0 = level display off
1 = level display on
h <x>
headphones
level
E = Encoder
L <x>
Line level
E = Encoder
F = fixed
A <x>
AES level
E = Encoder
F = fixed

Monitoring

Three outputs with individual volume settings are available:

1 Phones	**6.3 mm TRS jack, stereo** Connect the headphones here to monitor the selected single channel or the selected channel pair.
2 Line Out	**2 x XLR connector (male)** Requires connected DSUB-9 adaptor at the rear panel.
3 AES Out	**1 x XLR connector (male)** Requires connected DSUB-9 adaptor at the rear panel.

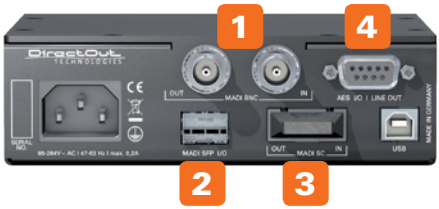


DSUB-9 to XLR adaptor

Signal	XLR
Line Out L	male
Line Out R	male
AES3 input	female
AES3 output	male

Pinout DSUB-9: See „Appendix A: Wiring AES I/O, Line Out“ on page 73.

Signal Input / Output



1 BNC OUT / IN	**2 x BNC socket (coaxial)** OUT: MADI output (64 ch), connect for MADI output signal here. IN: MADI input (64 ch), connect MADI input signal here.
2 SFP	**1 x SFP cage*** Insert SFP module here and connect MADI input/output
3 SC OUT / IN	**2 x SC socket (optical)** OUT: MADI output (64 ch), connect for MADI output signal here. IN: MADI input (64 ch), connect MADI input signal here.
4 AES I/O LINE OUT	**1 x DSUB-9 connector (female)** Connect delivered DSUB-9 adaptor here for XLR connection of AES I/O and Line Out.

* empty cage, module not included in delivery
See „Accessory“ on page 18.

WARNING!

Only use the delivered adaptor or observe correct pin assignment- see “Appendix A: Wiring AES I/O, Line Out” on page 73.

Servicing / Remote Control

An integral USB port is used for firmware updates and remote control.

USB	**USB 2.0 socket (Type B)** Connect here for firmware updates and remote control.

NOTE

For USB control please read the guide “Installation USB control”. See: www.directout.eu

CHAPTER 5: MA2CHBOX Remote

Introduction

The software application 'MA2CHBOX Remote' offers access to all settings of the device. Some features are accessible exclusively via the remote application:

- matrix channel based signal routing (M)
- adjustable channel mode for the output signal
- adjustable frame format for the output signal @ 2 FS
- bittransparent processing of AES input signal
- configuration of serial embedder routing
- routing of MIDI over MADI data

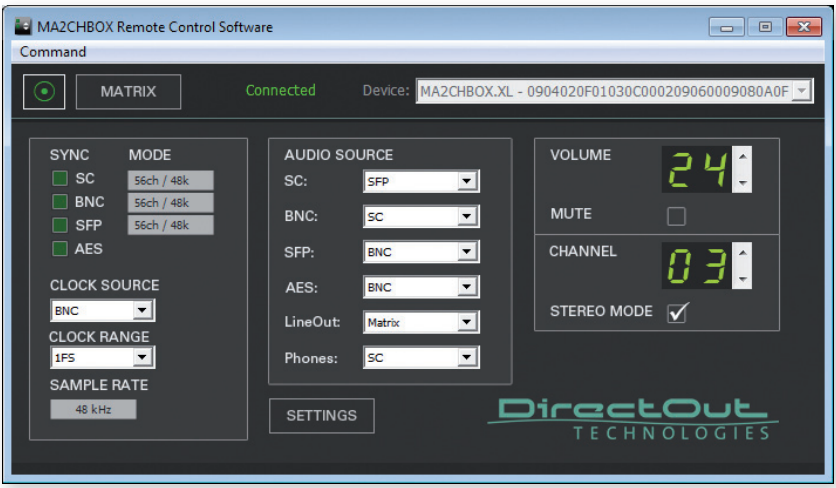
Requirements

- OS version Windows® XP, Vista, 7, 8, 10
- DirectOut USB Serial driver installed
- Firmware version 1.5 or higher

NOTE

The driver and installation instructions are available at www.directout.eu.

All settings are stored inside the device. Presets can be stored and recalled for quick configuration changes.



The overview informs about the input signal state and offers access to the clock setting, signal routing and the volume level and channel selection.

Click **SETTINGS** to access the settings of the device, the serial embedder and the MADI output format.

Click **MATRIX** to access the routing matrix for individual assembling of the audio signal routing.

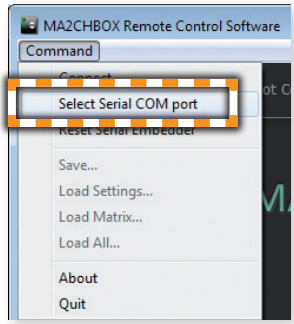
Connecting the device

Remote control is available via two different methods:

a) Serial data via USB

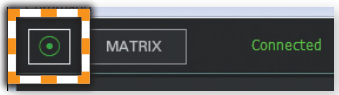
b) Serial over MADI (embedded RS-232 data)

The USB Serial driver is required for method a) only. However, it is required to have the driver installed anyway for initial setup and as fallback once a cabling or other issue interrupts the communication via the MADI link.

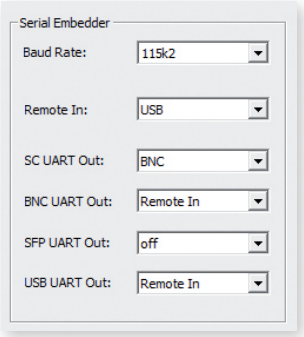


To connect the device via USB:

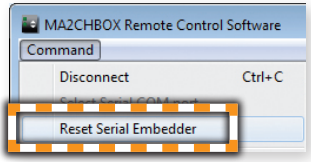
- Go to 'Command' and 'Select Serial COM port'
- Click Connect or use the connect button



Remote control via method b) needs a looped MADI connection with the connected device(s) for bidirectional communication and appropriate settings of the serial embedder matrix.



See „Settings“ on page 55 for information about the serial embedder matrix.

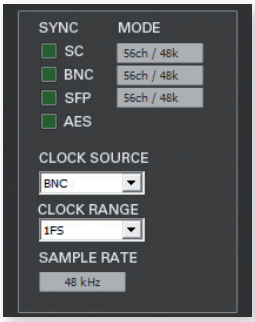


NOTE

In case of a communication loss via MADI link you may reset the serial embedder matrix to regain access via the local USB port.

Overview

Signal State



SYNC	Information about lock / sync state of input signal.
MODE	Individual display of MADI input signal format (frame format and channel mode).
CLOCK SOURCE	Pulldown menu to select clock source.
CLOCK RANGE	Pulldown menu to select scaling factor.
SAMPLE RATE	Display of the base rate of the device clock.

For information about the parameters please refer to „CHAPTER 4: Operation“ on page 27.

Audio Source

SC	Pulldown menu to select signal source for SC optical output.
BNC	Pulldown menu to select signal source for BNC coaxial output.
SFP	Pulldown menu to select signal source for SFP output.
AES	Pulldown menu to select signal source for AES3 output.
LineOut	Pulldown menu to select signal source for analog line output.
Phones	Pulldown menu to select signal source for headphones output.

For information about the parameters please refer to „CHAPTER 4: Operation“ on page 27.

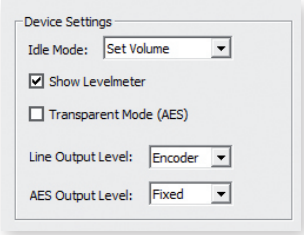
Volume / Channel

VOLUME	Display of volume setting. Arrow keys to increase (UP) or decrease (DOWN) volume level.
MUTE	Checkbox to mute / unmute all outputs that are set to 'encoder'.
CHANNEL	Display of channel selection of the MADI signal for the headphones, line out and AES output. Arrow keys to increase (UP) or decrease (DOWN) numeric selection.
STEREO MODE	Checkbox to toggle between stereo or mono mode.

For information about the parameters please refer to „CHAPTER 4: Operation“ on page 27.

Settings

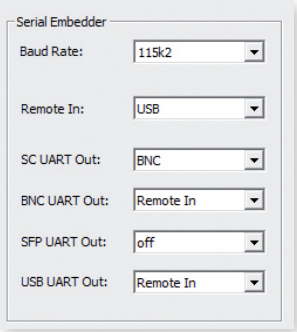
Device settings



Idle Mode	Pulldown menu to set the idle mode to either volume level or channel selection.
Show Levelmeter	Checkbox to toggle level meter display on or off in idle mode.
Transparent Mode (AES)	Checkbox to toggle bit-transparency of AES input to MADI output and vice versa.*
Line Output Levels	Pulldown menu to set the line output to a fixed level or to follow the encoder setting.
AES Output Levels	Pulldown menu to set the AES3 output to a fixed level or to follow the encoder setting.

* This setting may interfere with a connection method using the MADI link.

Serial Embedder Routing

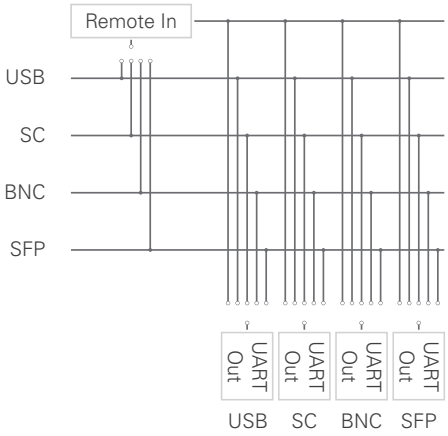


Baud Rate	Pulldown menu to select the transfer rate of the serial communication. Values: 115200 / 38400 / 19200 baud
Remote In	Pulldown menu to select signal port for incoming control data. Values: USB / SC / BNC / SFP
SC UART Out	Pulldown menu to select signal source of outgoing control data at the SC output. Values: SC / BNC / SFP / USB / Remote In / off

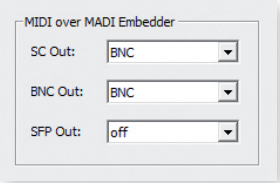
In case of a communication loss via MADI link you may reset the serial embedder matrix to regain access via the local USB port- see page 51.

BNC UART Out	Pulldown menu to select signal source of outgoing control data at the BNC output. Values: SC / BNC / SFP / USB / Remote In / off
SFP UART Out	Pulldown menu to select signal source of outgoing control data at the SFP output. Values: SC / BNC / SFP / USB / Remote In / off
USB UART Out	Pulldown menu to select signal source of outgoing control data at the USB port. Values: SC / BNC / SFP / USB / Remote In

Scheme



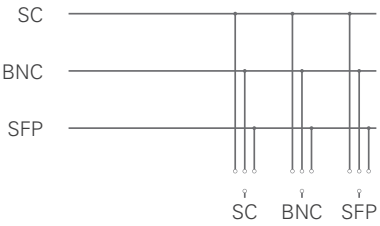
MIDI over MADI Routing



SC Out	Pulldown menu to select signal port of outgoing MIDI data at the SC output. Values: off / SC / BNC / SFP
BNC Out	Pulldown menu to select signal port of outgoing MIDI data at the BNC output. Values: off / SC / BNC / SFP
SFP Out	Pulldown menu to select signal port of outgoing MIDI data at the SFP output. Values: off / SC / BNC / SFP

MIDI over MADI means that the MIDI data is carried by user bit of audio channel 56.
The MIDI matrix allows to distribute or route the embedded MIDI data between the three MADI I/Os. However, it does not embed an external MIDI signal into a MADI stream or deembed from an incoming MADI stream.

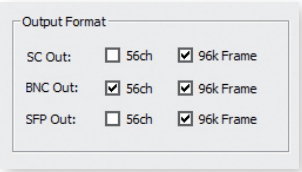
Scheme



NOTE

The output selection 'off' - in both serial embedder and MIDI matrix - means that the user bits of the incoming MADI signals stick with the routed audio signal.
Exception: Transparent Mode (AES) active is used - see page 55.
Serial over MADI: user bit audio channel 1 to 9
MIDI over MADI: user bit audio channel 56

Output Format



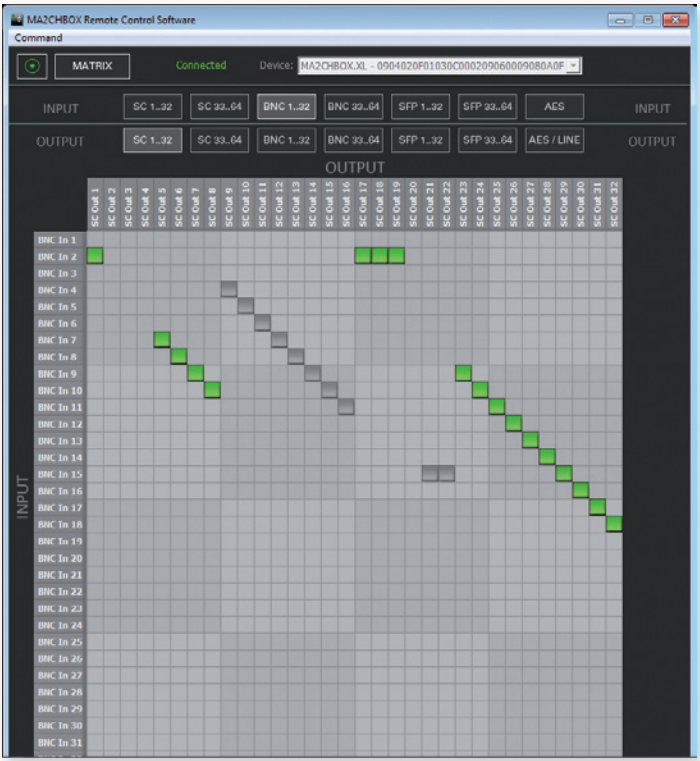
SC Out **BNC Out** **SFP Out** 56ch	Checkbox to toggle the channel mode of the MADI output signal between 56 ch and 64 ch.
SC Out **BNC Out** **SFP Out** 96k Frame	Checkbox to toggle the frame format of the MADI output signal between 48k Frame and 96k Frame.*

* 96k Frame is available at 2 FS operation only.

Matrix

The routing matrix offers access to single channel level of each I/O. To use the adjusted routing select ‚Matrix' as audio source in the overview.

Inputs are arranged vertically, outputs horizontally.



The different I/Os are organized in pages. So there are seven input pages and seven output pages.

The MADI I/Os are split into portions of 32 channels each to suit a better overview.

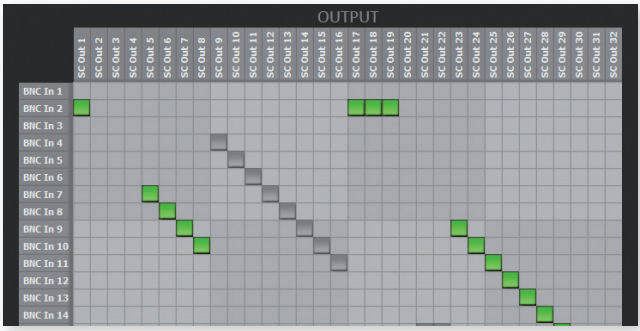
Input SC 1..32 SC 33..64 BNC 1..32 BNC 33..64 SFP 1..32 SFP 33..64 AES	Button to access the page of the particular input port. Example: SC 1..32 = SC port channel 1 to 32 SC 33..64 = SC port channel 33 to 64 AES = AES3 port channel 1/2
Output SC 1..32 SC 33..64 BNC 1..32 BNC 33..64 SFP 1..32 SFP 33..64 AES/LINE	Button to access the page of the particular output port. Example: SC 1..32 = SC port channel 1 to 32 SC 33..64 = SC port channel 33 to 64 AES/LINE = AES3 port & LineOut & Phones channel 1/2

Setting / deleting crosspoints

- move the cursor to the desired position- a small green square and transparent bars point the active position
- click into the square to set / delete the crosspoint

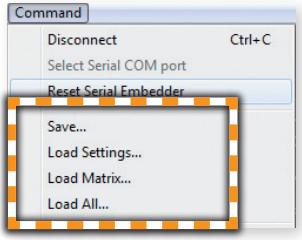
To set more than one crosspoint you may click and hold the left mouse button and move the cursor. The pointed crosspoints will be set upon release of the mouse button.

	crosspoint- output is set on the selected input page.
	crosspoint- output is set on a non-selected input page.



Presets

The settings of the device and routing matrix can be stored to a single file. The settings can be reloaded separately from the same file. This allows to use the settings independently from each other; e.g. you may reload another routing setup without changing the clock source.



Save...	Stores all settings in one file (.mbx).
Load Settings...	Restores all device settings except the routing matrix.
Load Matrix...	Restores the setting of the routing matrix only.
Load all...	Restores all settings including routing matrix.

CHAPTER 6: Troubleshooting and Maintenance

Troubleshooting

To identify a possible defect with the device please consult the following table.
If the fault cannot be resolved using these instructions, please contact your local DirectOut representative or visit support.directout.eu.

Issue	Possible reason	Solution
Device doesn't work.	Power supply is broken.	Check that the power supply switch is on, that the device is connected to the power supply and that the socket is working. Defective fuses must be exchanged by qualified service personal only.
Optical port does not work.	Optic is dirty.	Use an air supply to carefully remove any dust. Never use objects for cleaning.
No signal at the output port.	Connections (input / output) are mixed up.	Check the connections and change the cables if necessary. Check the routing matrix.

Issue	Possible reason	Solution
No signal at the output port.	Signal cable defective.	Exchange the signal cable.
No signal at the output port.	Connectors of the signal cable are dirty.	Use an air supply to carefully remove any dust. Never use objects for cleaning. or Exchange the signal cable.
MADI signal at the input is not stable.	Signal source is defective or bad signal condition (Jitter > 1 ns)- e.g. due to exceeded length or bad screening attenuation of signal cable.	Change the source or use appropriate cables.
Clicks in the audio signal.	Input source is not in sync with clock master of the box.	Check the status of input LED and check clock setting of the connected device.

Issue	Possible reason	Solution
Input LED is always blinking.	Input signal is not in sync with device or input signal is not stable or bad signal condition (Jitter > 1 ns)- e.g. due to exceeded length or bad screening attenuation of signal cable.	Change the source or use appropriate cables.
Display blinking in CH selection.	Channel is not available, due to scaling factor or 56 ch mode used.	Check the scaling factor in the menu or check the input signal.
Display is black.	No signal is present and level meter during idle mode is enabled.	Check input signal or switch off level meter (see page 42).

Maintenance

To clean the device, use a soft, dry cloth. To protect the surface, avoid using cleaning agents.

NOTE

The device should be disconnected from the power supply during the cleaning process.

CHAPTER 7: Technical Data

Dimensions

- Width 140 mm
- Height 42 mm
- Depth 146 mm

Weight

- 0.8 kg

Power Consumption

- 5 W (typical)

Power Supply

- 84 V- 264 V AC / 47 Hz- 63 Hz / Safety class 1

Environmental Conditions

- Operating temperature +5°C up to +45°C
- Relative humidity: 10%- 80%, non condensing

MADI Port SC optical

- 1 x SC socket FDDI (input / output)
- ISO/IEC 9314-3
- Wave length 1310 nm
- Multi-Mode 62.5/125 or 50/125

MADI Port BNC coaxial

- 2 x BNC socket (input / output)
- Impedance: 75 Ω
- 0.3 V up to 0.6 V (peak to peak)

MADI Port SFP

- 1 x SFP (empty cage without module)

Sample Rate

- 30- 50 kHz @1 FS
- 60- 100 kHz @ 2 FS
- 120- 200 kHz @ 4FS

MADI Format (I/O)

- 48k Frame, 96k Frame
- 56 channel, 64 channel

AES3 I/O

- 1 x DSUB-9 (adaptor to XLR included in delivery)
- AES3 balanced (input / output)

Phones

- 1 x TRS jack 6.3 mm (stereo)
- Level: +18 dBu
- SNR:-114.2 dB /-117.1 dBA
- THD+N:-103 dB
- THD:-106 dB

Line Output

- 1 x DSUB-9 (adaptor to XLR included in delivery)
- balanced output
- Level: +24 dBu
- SNR:-114.5 dB /-117.3 dBA
- THD+N:-105.5 dB
- THD:-108 dB

WARNING

Do not connect voltage sources to the analog outputs. This may cause damage at the output stages.

WARNING

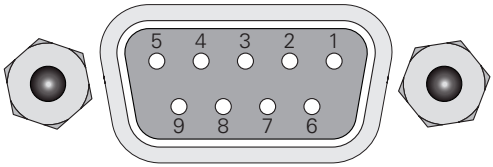
The line output is not servo balanced. Do not connect the negative lead to ground. This may cause damage at the output stage.

USB

- 1 x USB socket (Type B)
- for embedding / de-embedding of serial data, firmware updates and remote control
- Serial UART (universal asynchronous receiver/ transmitter)
- virtual COM-Port for Windows XP, Vista, 7, 8, 10

Appendix A: Wiring AES I/O, Line Out

DSUB-9 (female)



Pin	Signal
1	AES RX +
2	AES TX+
3	GND
4	Line Out L-
5	Line Out R-
6	AES RX-
7	AES TX-
8	Line Out L+
9	Line Out R+

NOTE!

The pinout does not comply with the adaptor delivered with MA2CHBOX.XT.

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